III.—CARPENTER: HUMAN PHYSIOLOGY.

PRINCIPLES OF HUMAN PHYSIOLOGY. By William B. Carpenter, M. D., F. R. S., etc. Edited by Henry Power, M. B., London, F. R. C. S., etc. A new American, from the Eighth Revised and Enlarged English Edition, with Notes and Additions. By Francis G. Smith, M. D. Philadelphia, 1876. Henry C. Lea. 1,083 pages. Chicago: Jansen, McClurg & Co.

During the past four or five years physiological research has been so active, and the advances in this department so great, that text-books on physiology of only a few years' date have fallen completely behind in regard to many very important questions, and new editions have become an absolute necessity. Therefore, we have seen appear within the past two or three years, a new edition of the well-known work of Dalton, to a great extent rewritten and very much enlarged, and a new candidate for public favor in the elaborate work of Flint. Now, in obedience to this necessity, we have a new edition of Dr. Carpenter's standard work, which has so long been an authority in this country, and in Great Britain.

It is needless for us to speak of the merits of the original work of Dr. Carpenter, they are already sufficiently well known and appreciated by the profession. The only points we are called to notice here, are the changes and additions introduced by the editors in this addition, and principally by the English editor, Mr. Henry Power. The additions by the American are valuable, but they form only a very small portion of the whole. We shall also pay particular attention to certain portions relating to the nervous system, its functions, etc., and the nervous apparatuses of the organs of the body, rather than to other parts of the book, since these come within the special province of this JOURNAL; and while we are glad to bear testimony to the general excellence of the work, and to the fact that it, with the additions made by the editors in this edition, is more nearly up to the times than any other manual of equal size, we shall have to notice, in detail, several points in regard to which it appears to us defective. It is absolutely impossible for any work on physiology to be a perfect epitome of our knowledge at the time of its publication, the science is so rapidly advancing that even a few months, or weeks, may develop very important discoveries. Admitting this, however, it is still advisable to call attention, in a notice like the present, to even unavoidable deficiencies, not as an ungracious act of criticism, but to mark the points in regard to which the statements of the work should be taken with allowance, or supplemented by reference elsewhere. Physiology now-a-days can be studied only by the aid of the periodical literature of the science, the value of the text-books, and even of more extensive manuals, is that they give us a starting point from which to carry on still more extended studies; and as they give us a more or less complete statement of the actual state of the science at the date of their publications, their value as such a basis for study is correspondingly affected.

The present volume, as we have stated already, is, to all appearance, with the additions made by the editors, the most complete manual of its compass in our language. Still, it gives evidence of some deficiencies in details, and some general defects, in the parts relating to the nervous system. The one of these latter that seems to us to most prominently call for notice here, is not one of this edition solely, nor of this work, but is common to all, or nearly all the physiological writings of the day. It is a general custom in the descriptions of the functions of the nervous system to speak of nerve fibres as if they, of themselves, possessed special motor, sensory, or other peculiar properties. The use of the terms "motor fibres," "sensory fibres," "trophic fibres," etc., is almost unavoidable, and has its conveniences, but they should not be used in such a manner as to imply in any way that the nerves themselves, apart from their terminal apparatuses, have any special motor or sensory endowments. They are, in all probability, mere conductors, conveying impressions to and from special apparatuses at either terminus, the sending apparatus being, in the case of the sensory nerves, at the periphery, in the motor nerves at the centres, and the receiving apparatus correspondingly at the other termination. There is every *a priori* probability in favor of this view of the function of the nerve fibres, abundant analogy, and some quite strong physiological evidence in its favor. In the Periscope of the present number of the JOURNAL, we have alluded to this point, and quoted the well-known experiment of MM. Vulpian and Phillipeaux, who united the hypoglossal and lingual nerves. The result was as might have been anticipated with the view here presented, a complete suppression of function since a peripheral motor apparatus was connected by the operation with a central sensory receiving mechanism which could not give out motor impulses, any more than the muscles of the tongue could normally send to it sensory impressions. Nevertheless, irritation of the common conducting fibres produced movements of the tongue, for which everything was prepared except the excitation, which had to be thus artificially supplied. The explanation, however, given by the experimenters, that the lingual became possessed of motor fibres after the operation, that it did not previously contain, shows the physiological error we are here combatting.

That excitation of the nerve at points along its course should produce motor or sensory symptoms, is not surprising, or in contradiction to the view here held. By producing a molecular commotion in the nerve it arouses the functional activity of its terminal receiving apparatus, central or peripheral, as the nerve happens to be sensory or motor. It is a fact, however, that has been pointed out by physiologists, that this clumsy method of exciting the functional activity of this terminal apparatus, is not nearly as effective as the normal physiological one; that a motor nerve may cease to react to external irritants whilst it still is capable of conducting impressions from its centre in reflexes.

We have given so much attention to this point here, because it appears to us that too little altogether is made of it in the work, and the impression is produced that the nerves are even more than mere conductors, and that conduction itself is a peculiar property, according as the nerve is motor or sensory. Then, the remarks upon centripetal motor conduction might be spared, if this view of nerve function were kept in mind. But the error, either of comprehension or statement, pervades nearly all the literature of the subject, and we wish to enter here our protest against its becoming more general.

The view of Brown-Sequard that there are special fibres for the conduction of the different sense impressions of pain, heat, tact, etc , is mentioned with apparent approval, as being supported by very strong evidence, even in the way and to the extent in which its author holds it; that these special sense conductors occupy different tracts of the spinal cord. It appears to us that this is one of the more doubtful hypotheses in nerve physiology, and not by any means the best method of explaining the facts that have suggested it. Another of Brown-Sequard's views, that is at least partially favored by the editor, is that regarding the optic decussation, that it is complete and not, as according to the usually received.opinions, a partial one. On this latter point, however, the editor is not very outspoken in his opinion, and his bias is only inferred from his manner of stating the facts and arguments of both sides of the question.

The same may be said of the remarks upon trophic nerves, the existence of which, we infer, the editor is not disposed to admit; even the opinion that nutrition is under the control of the nervous system, does not appear to meet with much favor in his mind. While we are willing to have the existence of special trophic nerves disputed, it yet appears to us that there are many better proofs of the influence of the nervous system over nutritive processes than are given in this work, and, indeed, that there are few physiological theories that have stronger support, inferential and absolute, than that of nervous trophic action. The statements of this volume, therefore, seem to us to be somewhat misguiding to the student.

In most other respects, the section on the nervous system is, on the whole, a very satisfactory statement of the present condition of our knowledge, quite as complete as could be expected in a work of this compass. That portion on the spinal cord and medulla is more full than that on the cerebrum and the cerebral ganglia, but perhaps the latter is sufficiently so. A pretty well detailed account of Meynert's views of cerebral physiology is given, and is the more intelligible since a schematic illustration accompanies the text. A brief account is also given of the experiments of Fritsch and Hitzig, Ferrier, Nothnagel, and others, upon the motor centres of the cortex. The section upon the special senses seems to be also quite complete, and closes with an exposition of Fechner's law of the measure of our sensations, a matter of some considerable interest, which we do not remember having seen explained in other recent English text-books on physiology, at least to any extent.

As regards the other sections of the work, we have no special criticisms to offer. The nervous apparatuses of the circulation, the respiration, and of the digestive organs, are quite fully described and very recent authorities and memoirs referred to. There are undoubtedly some omissions and defects of arrangement, but we have been agreeably surprised to find the volume so complete in regard to the structure and functions of the nervous system in all its relations, a subject that, in many respects, is one of the most difficult of all, in the whole range of physiology, upon which to produce a full and satisfactory treatise of the class to which the one before us belongs. This is especially the case at the present time, when, as we have already said, physiological research is so active in this special department.

The additions by the American editor, though not numerous, nor generally lengthy, frequently supplement those of Dr. Power very usefully, and give to the work as it is, a considerable value beyond that of the last English edition.

In conclusion, we can give our cordial recommendation to the work as it now appears. The editors have, with their additions to the only work on physiology in our language that in the fullest sense of the word is the production of a philosopher, as well as physiologist, brought it up, as fully as could be expected, if not desired, to the standard of our knowledge of its subject at the present day. It will deservedly maintain the place it has always had in the favor of the medical profession.